

A Summary of the State of Georgia's Vision for Software Reuse

Note: This document is a synopsis of *Software Reuse-Draft Vision Version 1.2*; a complete vision document derived through the Rational Unified Process®.

The success and survival of information technology enterprises in 2002 and beyond will require that application solutions can be rapidly deployed and reassembled targeting a variety of software platforms. To achieve this level of speed and flexibility, organizations must adopt a service-oriented architecture based on reusable components involving all software assets—including packages, legacy applications and new component-based services. Potential benefits include reduction in the length and cost of system life cycles, reduction in maintenance costs, quality improvement, and lower market costs. To maximize the return on investment and minimize the risks in making such a fundamental change, enterprises must formally implement a software reuse program. The effort must include strategic planning for a component catalog, related infrastructure, and methodological changes in support of the reuse objectives.

The vision of the **State of Georgia's Software Reuse Initiative** is to drive Georgia's software community from its current 're-invent the software' cycle to a process-driven, domain-specific, architecture-centric, library-based way of constructing software. The proposed strategy to realize this vision is based on systemic reuse: where opportunities are predefined and a process for capitalizing on those opportunities is realized. The software reuse vision describes the Georgia Technology Authority (GTA) and the State of Georgia's desire to provide a common goal for all of the producers and consumers of software products within State government. The stakeholders for the State of Georgia's Software Reuse Initiative are the producers, brokers and consumers of software products within state government. All state agencies and organizations interested in creating, supporting and/or using internal or external markets for reusable software assets have an interest in the collaborative processes surrounding a reuse strategy. Further, the stakeholder group also includes external vendors who have been commissioned by the State to produce software assets.

The goal of the State of Georgia's Software Reuse Initiative is to improve the efficiency of software development by 20 percent and the efficiency of software maintenance by 40 percent. To achieve these savings, the State must plan ahead to maximize systemic re-use, to maximize the potential return on investment, and to minimize risks associated with adopting a new software engineering process. Return on Investment from reuse is achieved in two of the software lifecycle disciplines: development and maintenance. Savings in

development are achieved when existing reusable components are used to assemble new software. Savings in maintenance occur due to reductions in original code and the higher quality associated with a reusable component that has been tested and deployed multiple times. Savings in maintenance are generally of greater value than savings achieved in the development cycle since the maintenance lifecycle typically accounts for 60-80% of the total project cost.

With the benefits come the costs of implementing a software reuse program. These are both tangible and intangible. For example, the major recurrent costs associated with implementing reuse are higher development costs. In fact, development costs are typically anywhere from a factor of 1.5 to 2.0 higher than in an organization that is not implementing a reuse strategy. Intangible costs include: mitigating the upfront governance issues, intellectual property rights, procurement issues, and developing processes which ensure a rich and viable repository at both the state and national level. Further, the benefits from reuse are generally not fully recuperated during the reuse pilot but rather, are accumulated over the life of the reuse initiative, which was six to eight years in the cases examined.

Planning Issues and Recommendations

- This program should complement the *Component Repository Initiative*. The reuse team created to support this project will be able to ensure that quality components are commissioned and acquired by the State of Georgia.
- A planning phase is critical to the success of a systemic reuse program. The pilot project and subsequent iterative implementations will serve as a test for the proposed reuse practices and a showcase for wider deployment.
- A reuse program must be rolled out in step with increasing the maturity level of the software development teams. The project team should preferably already be proficient in component based development (CBD) and have a number of successful CBD projects to its credit.
- The impact of the reuse program is proportional to the size of the reuse team and the size of the organization it is trying to influence. The typical, and there is no “typical” reuse program, runs from eight to ten years with the initial investigation, planning and implementation phases occurring over a two to four year time frame.
- The GTA should not undertake a formal review of reuse potential at this time, but instead apply industry metrics based on the State of Georgia’s software development and maintenance budgets.

- The GTA should ensure that targeted software development communities within the State of Georgia have achieved a minimum level of capability as a parallel but critical goal for a successful reuse program.
- The GTA should adopt an incremental implementation plan, developed during the planning phase. This will ensure that the existing scarce human resources are not over stretched during implementation.
- The GTA should partner with external development contractors who have existing reuse and Capability Maturity Model (CMM) level 4 / 5 component based development programs. This partnership will accelerate the reuse program in the implementation phase.

Summary and Next Steps

- The reuse program should be established iteratively, using the Rational Unified Process® (RUP,) and the corresponding stages: *Initiating, Investigation, Planning, Implementation, and Continuous Improvement*.
- The Investigation Phase should consist of a systematic investigation of the feasibility of software reuse. All business goals should be clarified and supporting reuse characteristics should be considered: baseline measurements, infrastructure availability, assets, personnel and technology.
- The GTA does not currently have available resources with the skills that will be required during the Planning Phase. Therefore these resources must be identified during the Investigation Phase.
- Three of the most critical success factors for the Planning Phase are: ensuring that GTA is sufficiently far along in developing its reuse aptitude¹, that pilot reuse resources are allocated and identifying the first candidate projects.

After a successful Planning Phase, the GTA can better determine the benefits of a reuse program. In parallel with the RUP phases, relationships with other states should be cultivated to ensure a steady-state governance for collaboration within the reuse marketplace. Connections to other states, as well as relationships to appropriate vendors, will help begin to form a culture where reuse can have the potential to given benefit to states who are serving roles either as developers or as consumers of components from reuse repositories.

¹ See *Software Reuse-Draft Version*; Stephen Clarke Version 1.1; p. 16 for full delineation of *reuse aptitude*